

Vigienose

Vigienose



« Rack » design



Industrial

« Wall mounted » design

This instrument is an online instrument to analyse and monitor the odorous compounds: sulfurs and VOCs

Vigienose

Applications:

- Odor control monitoring
- Deodorisation process
- Fugitive emissions
- Process control
- Fence line, ...



Targetted compounds:

- H_2S
- SO_2
- Methyl mercaptan
- Ethyl mercaptan
- DMS
- DMDS
- DES
- Total VOC
- More sulfurs (option)
- Odor Index

- Analysis principles
- Internal modules presentation
- Installation
- Software
- Calibration
- Service
- Preventive maintenance
- Troubleshooting
- Remote control
- Chromatotec Technical website
- New design of the Medor detector

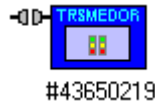
Analysis principles



Vigienose = combination between:



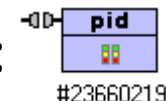
TRS Medor:



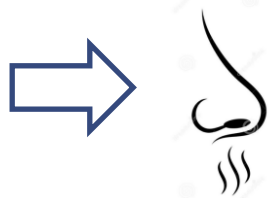
- Gas Chromatograph
 - ✓ Real separation between sulfurs
 - ✓ 2 chromatographic columns
 - ✓ Sampling loop
 - ✓ Wet cell detector specific to sulfurs
 - ✓ Speciation of the sulfur compounds



Total VOC detector:



- Direct Detector
 - ✓ Photo Ionisation Detector used: PID
 - ✓ “Level” of VOC detected
 - ✓ Comparison : zero air/sample gas
 - ✓ No separation between molecules



To propose an Odor index

For both modules:

- The air is sampled from outside using a sampling pump
- The air sampled must be at ambient pressure
- An internal DMS permeation tube is used to calibrate both modules in automatic mode. Calibration gas available all the time.

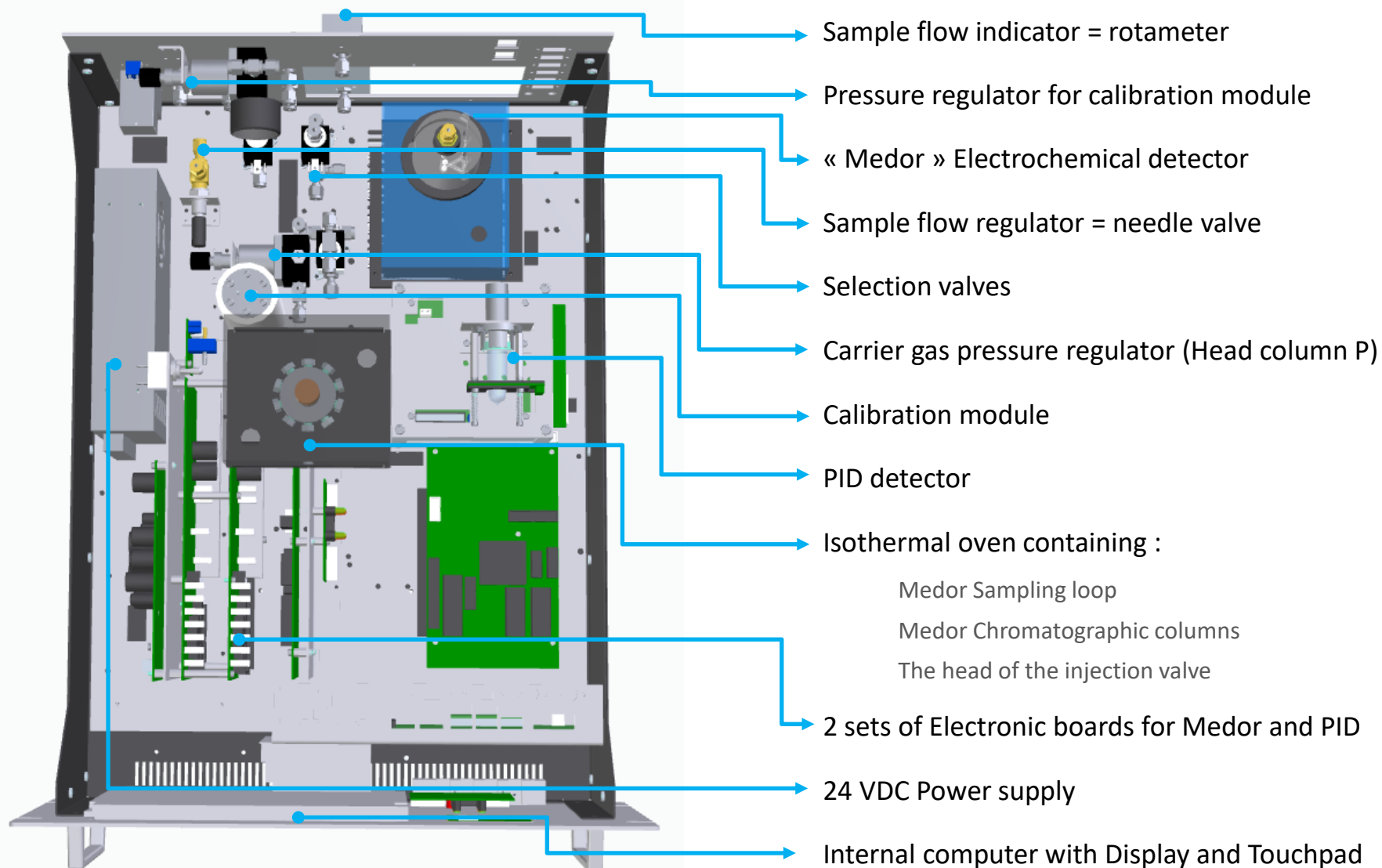
For the « Medor » module

- The sample is injected from a sampling loop into the columns
- The sample travels through the columns, to separate the sulfur compounds, and is introduced to the electrochemical cell for the detection of sulfur species.
- The detection is achieved by a gas-liquid reaction, specific to the sulfur compounds.

For the “PID” module:

- Sample flow impacting directly the PID UV lamp
- For each analysis cycle: automatic comparison of the PID signal: zero air/sample

Top View

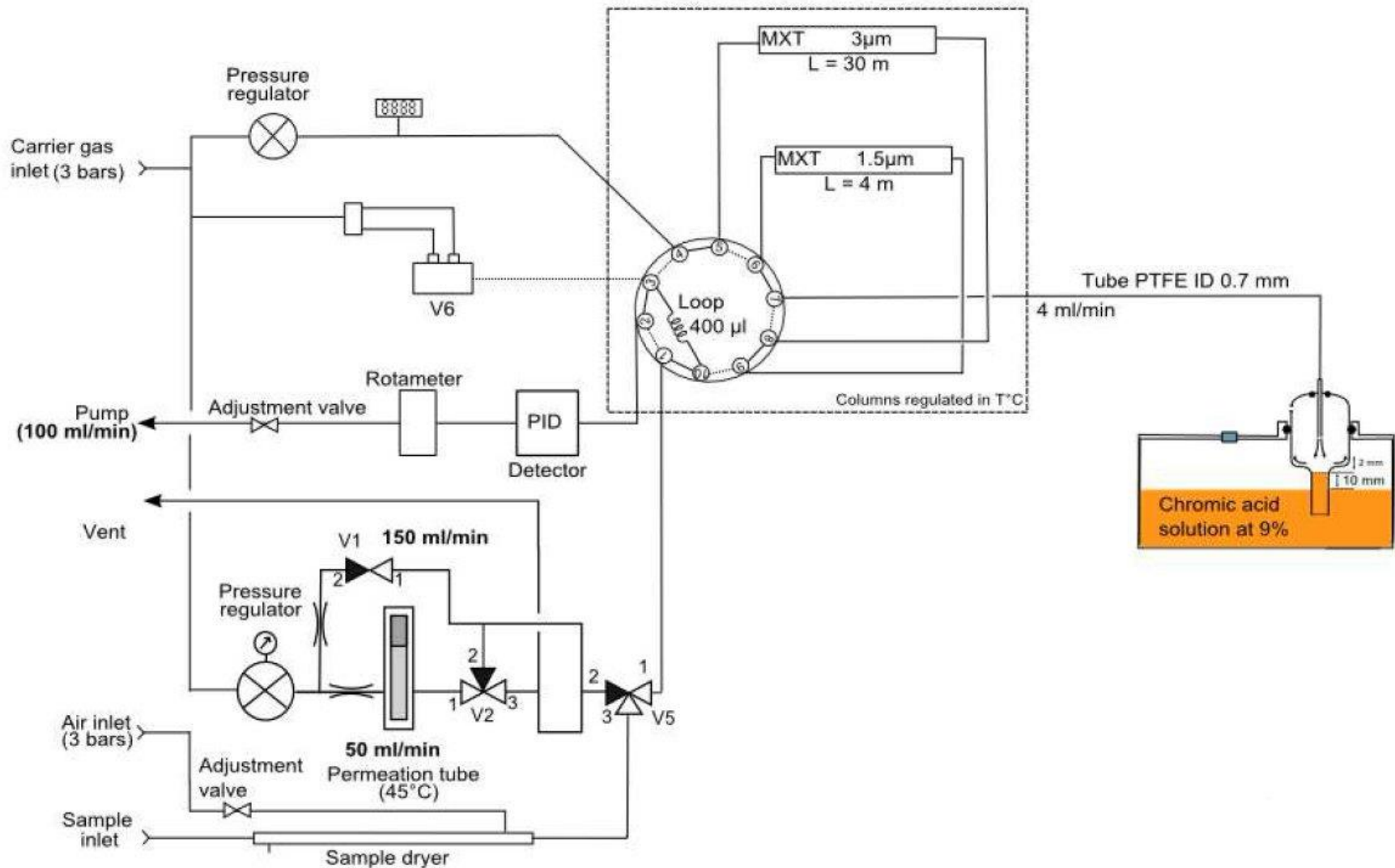


Principle – Sampling phase

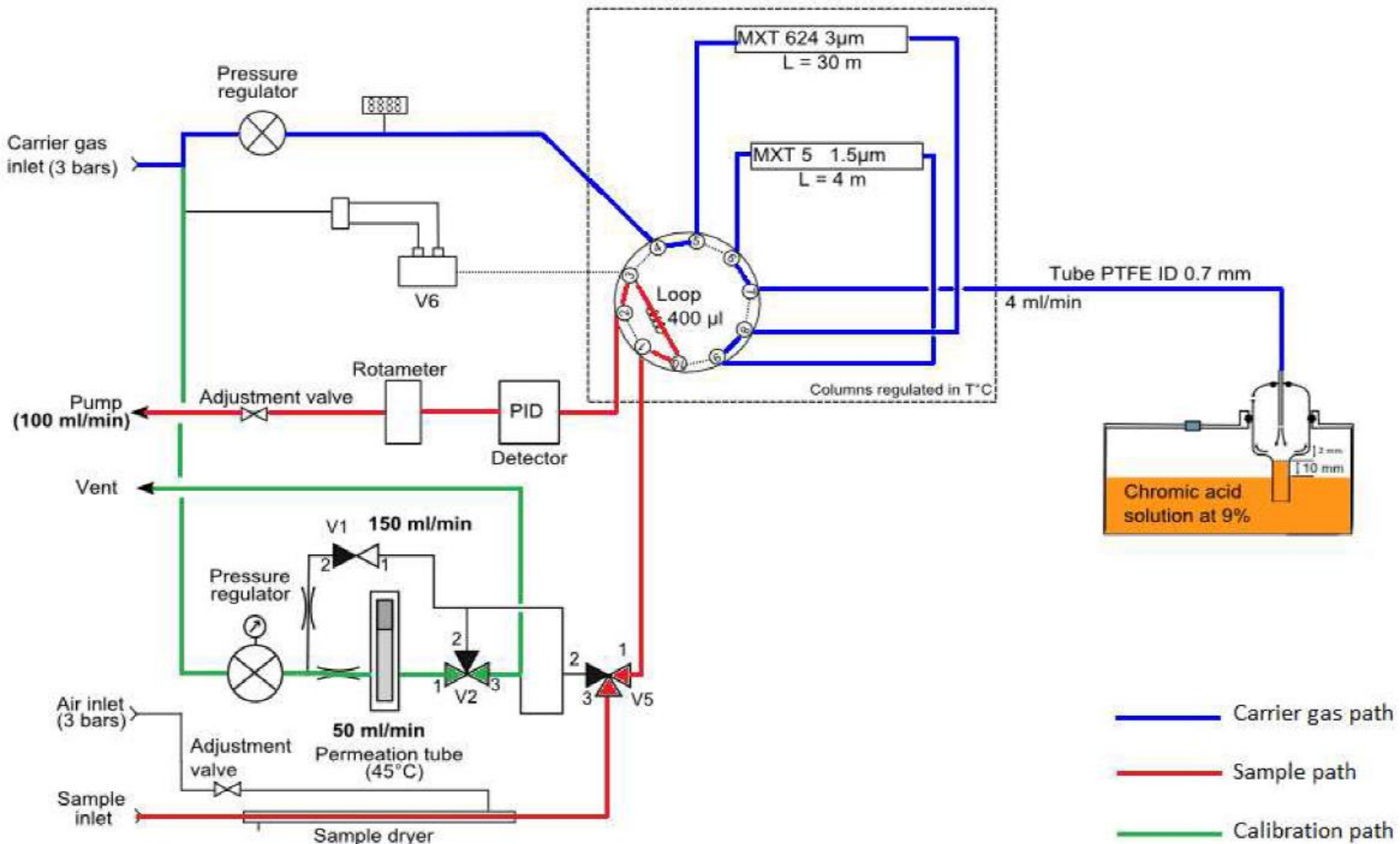
- The sample gas circulation is carried out:
 - With a sampling pump
 - Flow regulation done by a needle valve
 - The sample flushes a sampling loop for the « Medor »
 - The sample is directly impacted on the PID lamp
- Carrier gas travels through the columns and into the Medor detector
- Flat signal is emitted by the Medor detector: “base line”
- Signal is emitted by the PID, impacted with sample



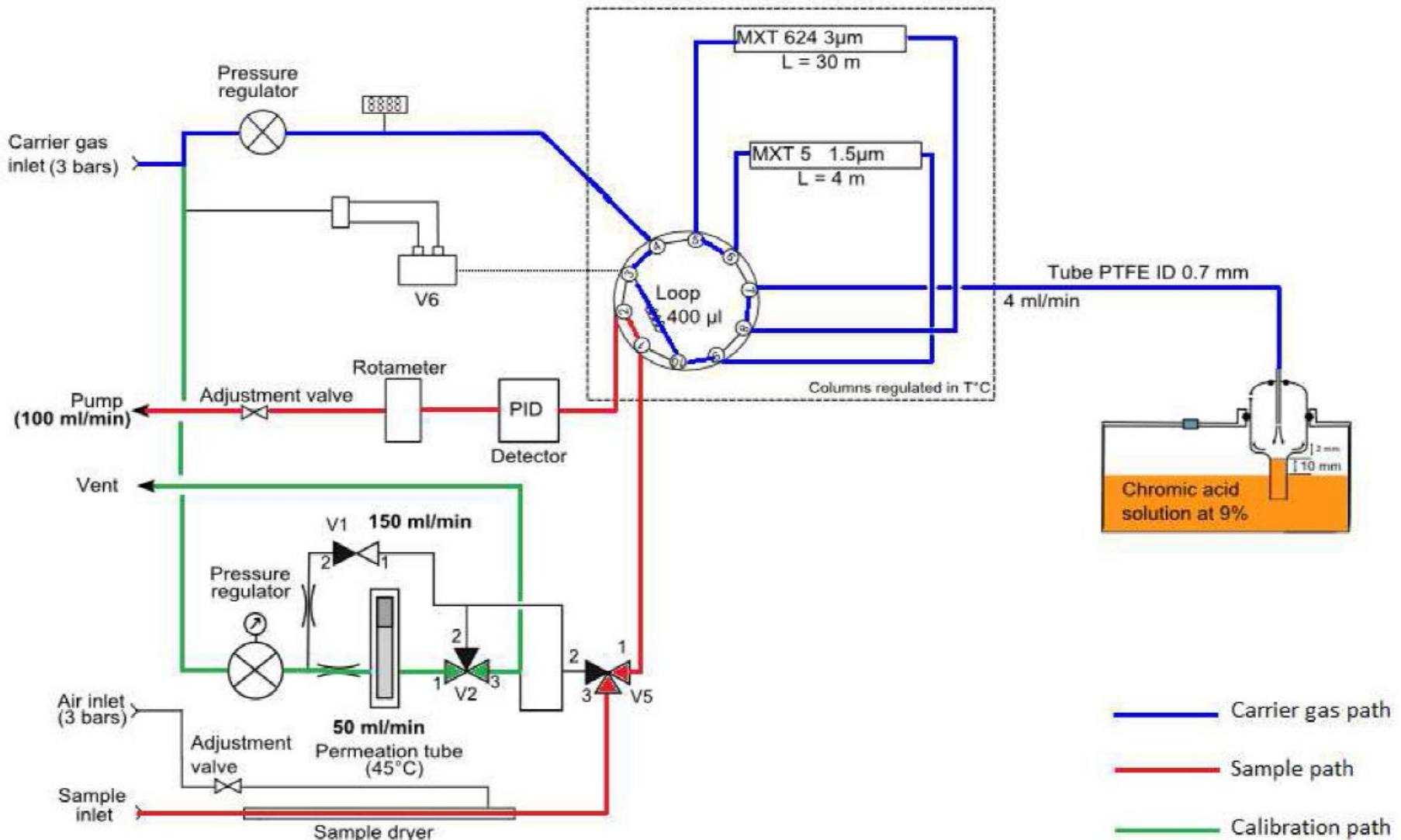
Principle – Pneumatic scheme



Principle – Medor Sampling mode

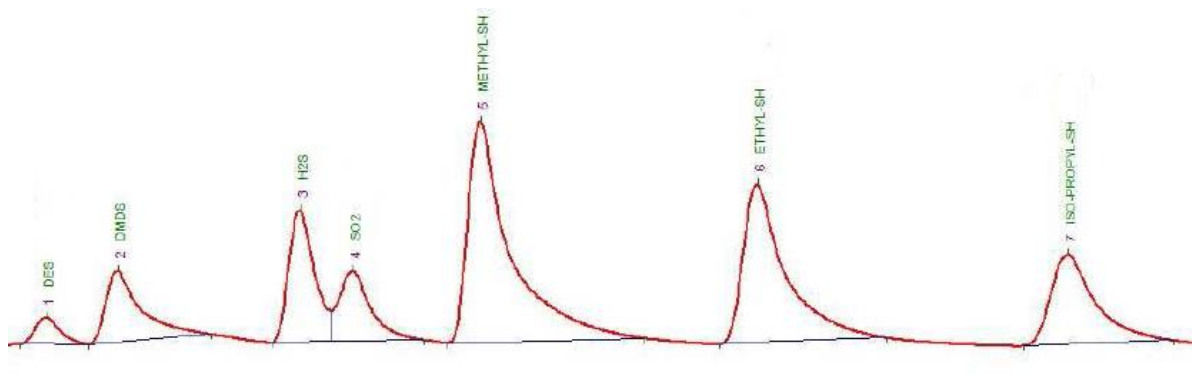
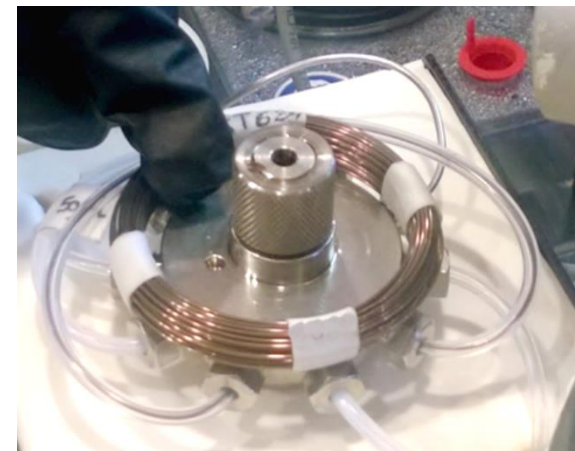


Principle – Medor Injection mode



Principle – Medor Injection mode

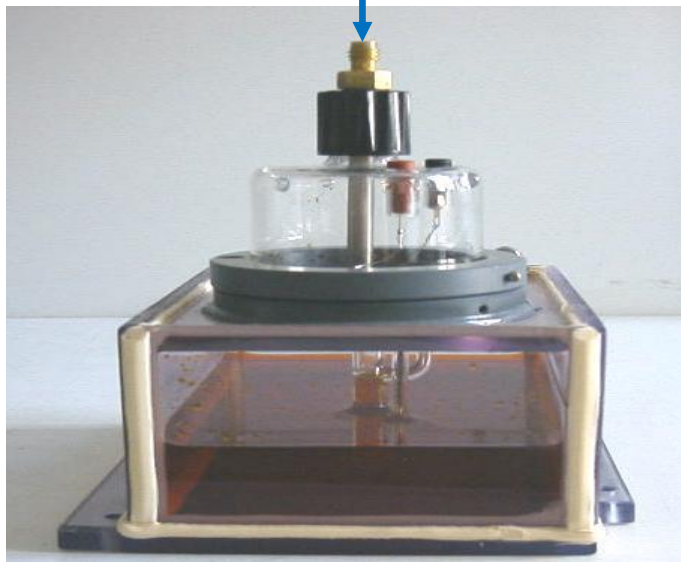
- The sample is pushed out of the loop by the carrier gas towards the columns
- Sulfur compounds cross the columns and are detected, one by one by the detector
- The signal from the detector increases every time a sulfur compound reaches the detector



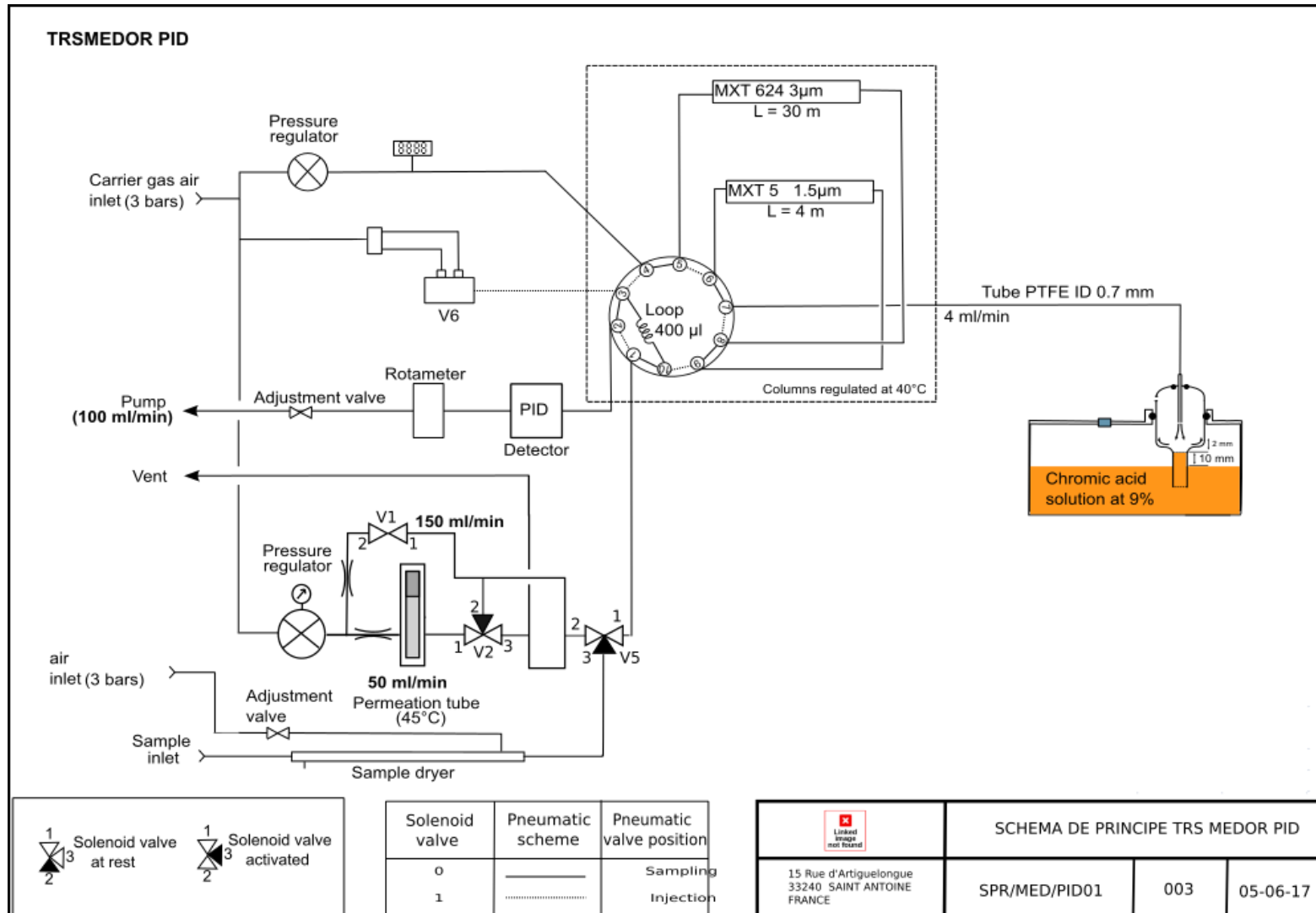
Principle – Medor Detection

- The sulfurs are detected by the wet cell through a gas-liquid reaction (oxidation-reduction reaction)

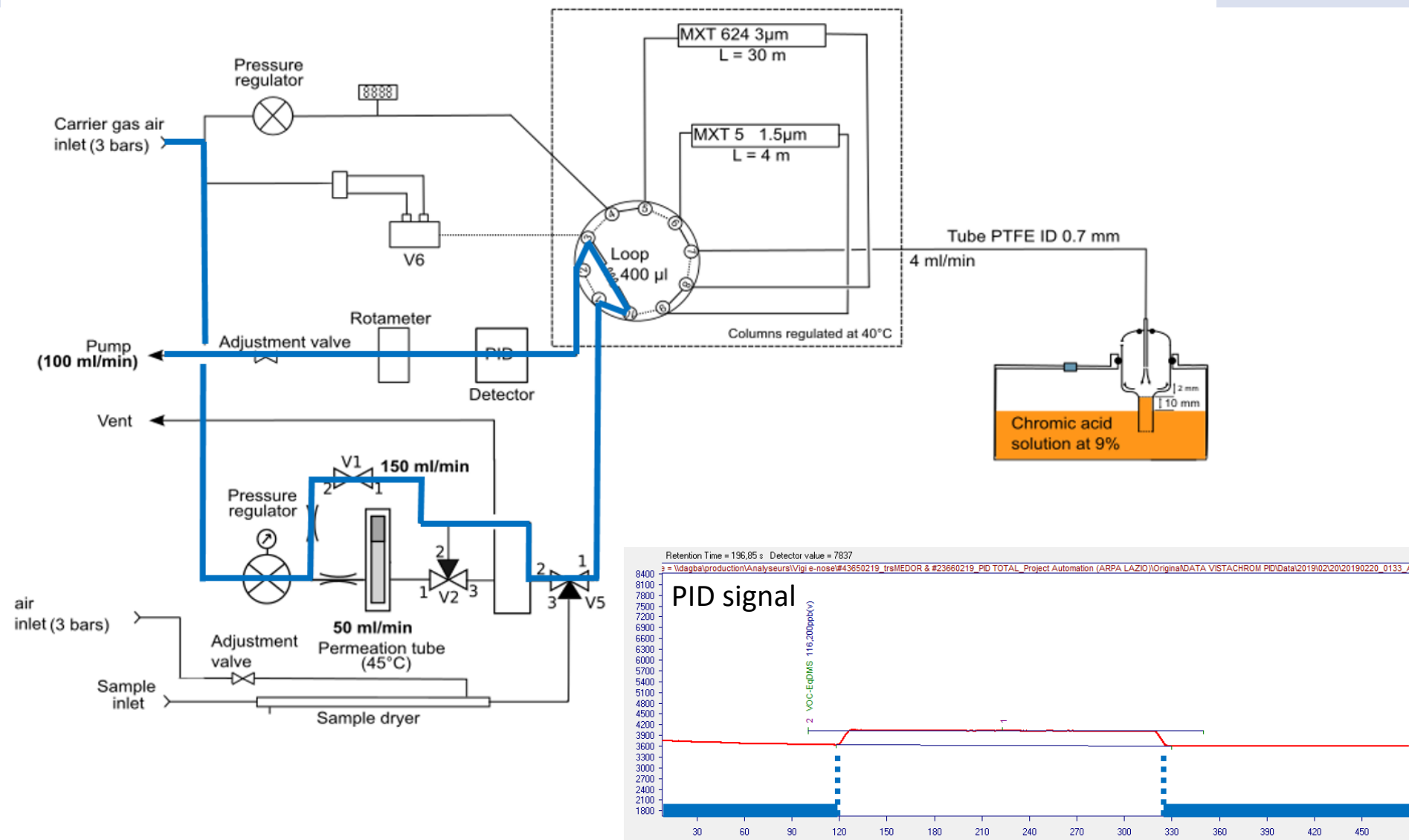
Sulfurs coming from
the columns



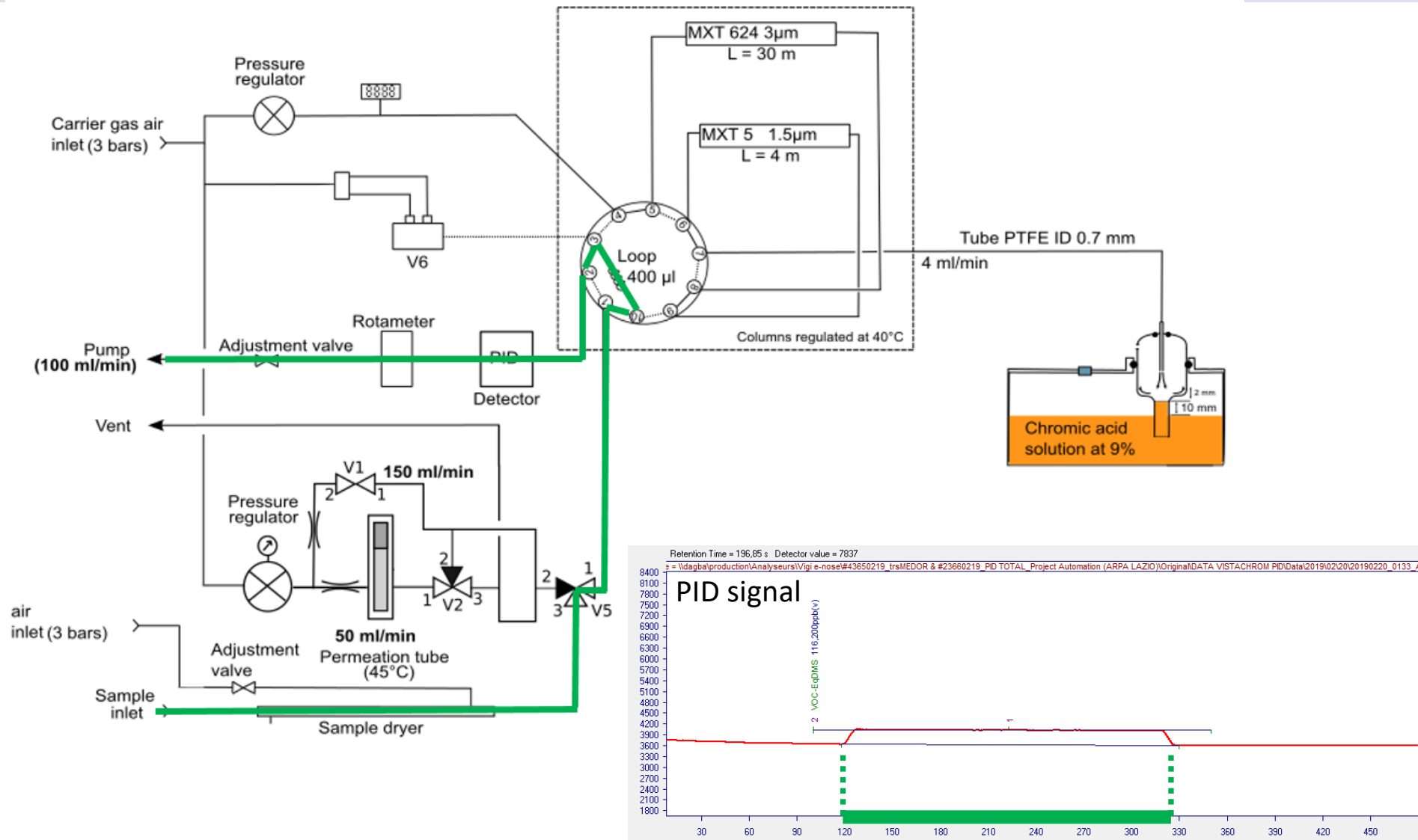
Principle – PID direct detector



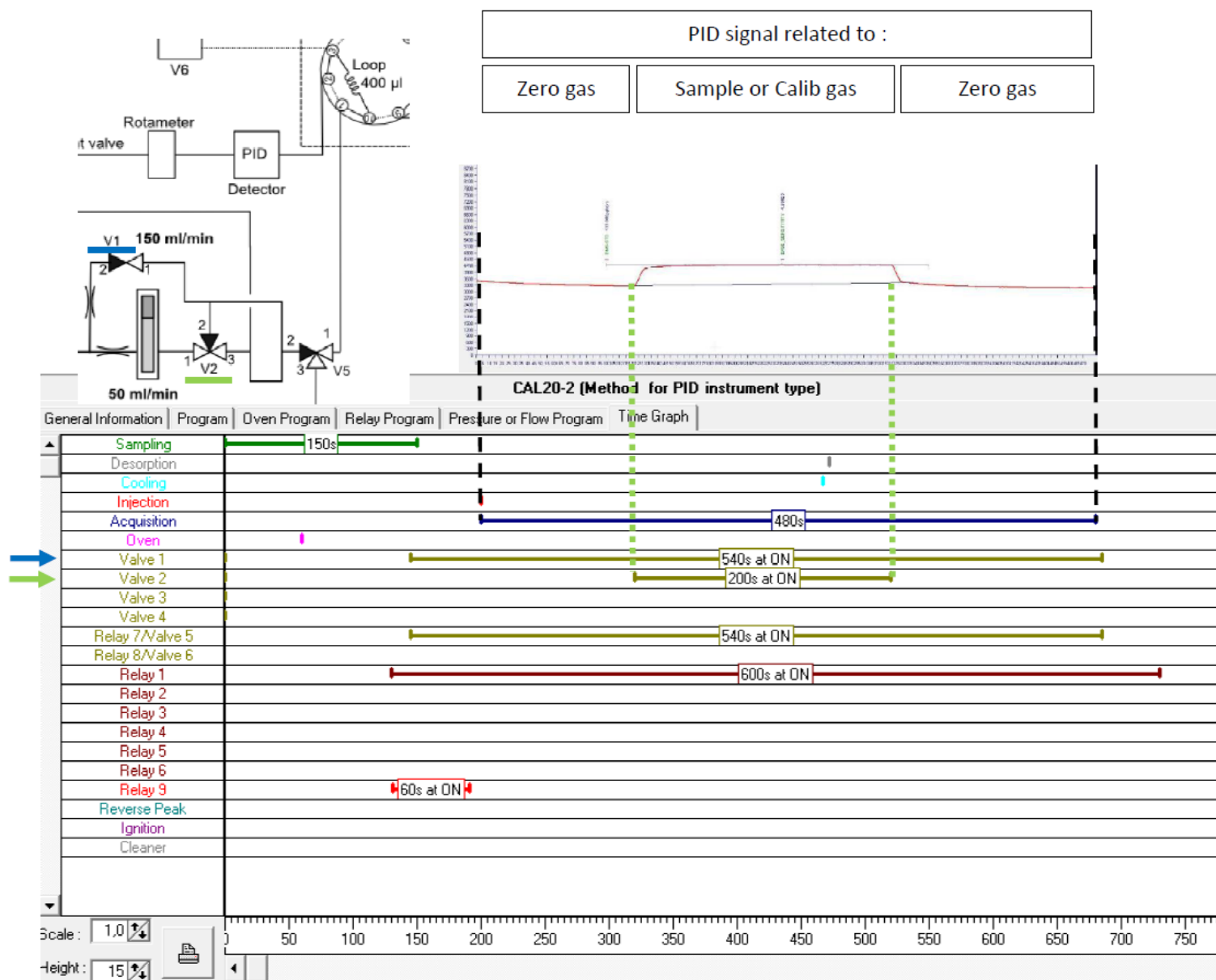
Principle – PID zero air analysis



Principle – PID Sample analysis



Principle – PID - Calibration



Odor Index calculation

Vigienose = combination between:

TRS Medor:

- H_2S concentration
- SO_2 concentration
- MeSH concentration
- DMS concentration, ...

“Group” from Medor:

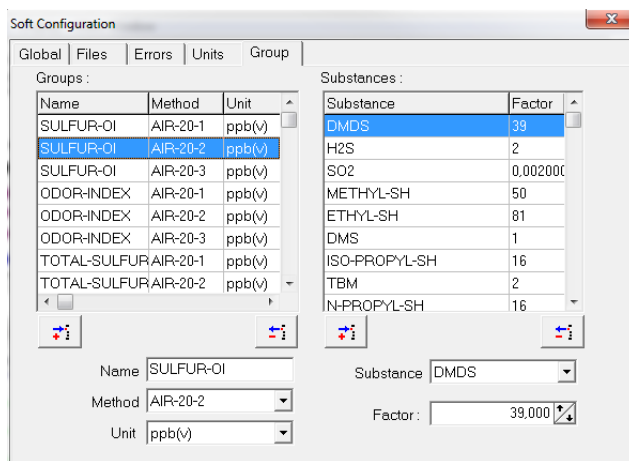
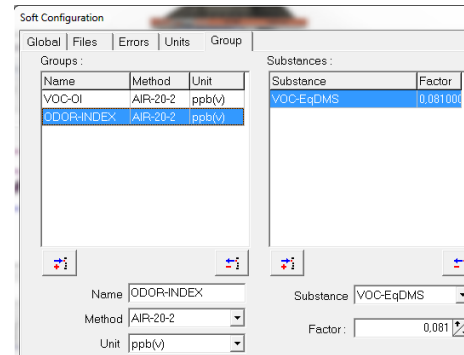
- Sulfur Odor Index

PID detector:

- One result = Total VOC concentration

“Group” from PID:

- PID Odor Index



Combination using Vistachrom MathModule
To propose a global Odor index



Odor Index calculation

Vigienose = combination between:



TRS Medor:

“Group” from Medor = Sulfur Odor Index

PID detector:

“Group” from PID = VOC Odor Index

$$VOC\ OI = [VOC\ EqDMS] \times \frac{1}{DMS\ Odor\ threshold}$$

- Use of specific weighting factors for each molecule ¹
- Each factor depends on the Odor threshold of each sulfur compound

$$Sulfur\ OI = \sum_{i=1}^{all\ the\ sulfurs} [sulfur]_i \times \frac{1}{sulfur_i\ Odor\ threshold}$$



$$Global\ OI = Sulfur\ OI + VOC\ OI$$



¹: “Odor thresholds and irritation levels of several chemical substances : A review” – J. H. RUTH – American Industrial Association Journal – 05/1986

Installation

OPERATING CONDITIONS					
GAS	He (5.5)	H ₂ (5.6)	Nitrogen (Nitroxichrom #56881019)		
Inlet pressure	----	----	3 Bars		Ar (6.0) Zero air
Used pressure	----	----	CG	Permeation oven	----
Flow rate (ml/min)	----	----	198 (+/-2) hPa	≈ 0.4 bar	----
			CG	Permeation oven	----
			3.5-4	111.04 or 207.80	----

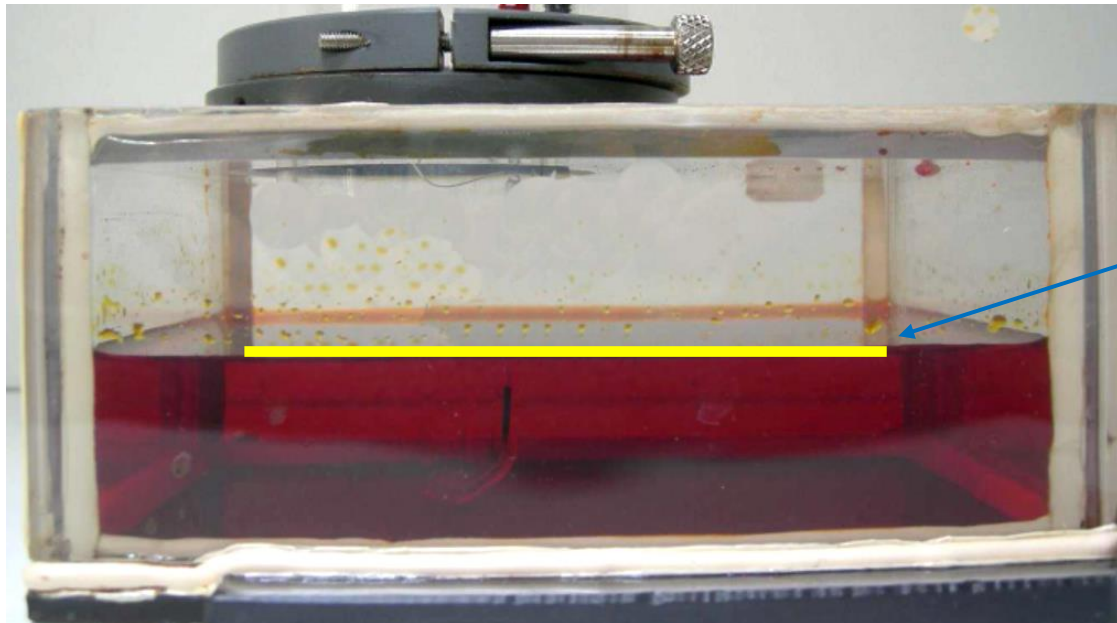
- Before unboxing the instrument
 - Read the QC report (most important document)
 - Read the easy start document
 - Purge the gas generator during one hour! (no connection the generator to the GC)
 - Purge your sampling line during 1 hour ! (no connection the line to the GC)
 - Intelligently select the location for the instrument : no vibration, smooth Air Conditionning...



The damages created by skipping the purge of the generators will not be covered by the warranty!

Installation – Fill the tank

- Fill the Medor tank with Chromic acid solution (9%)
 - Use appropriate chemical protection equipment: gloves, glasses...
 - Put liquid until reaching the line



Black mark present
on the tank side

Installation – Medor Glass detector

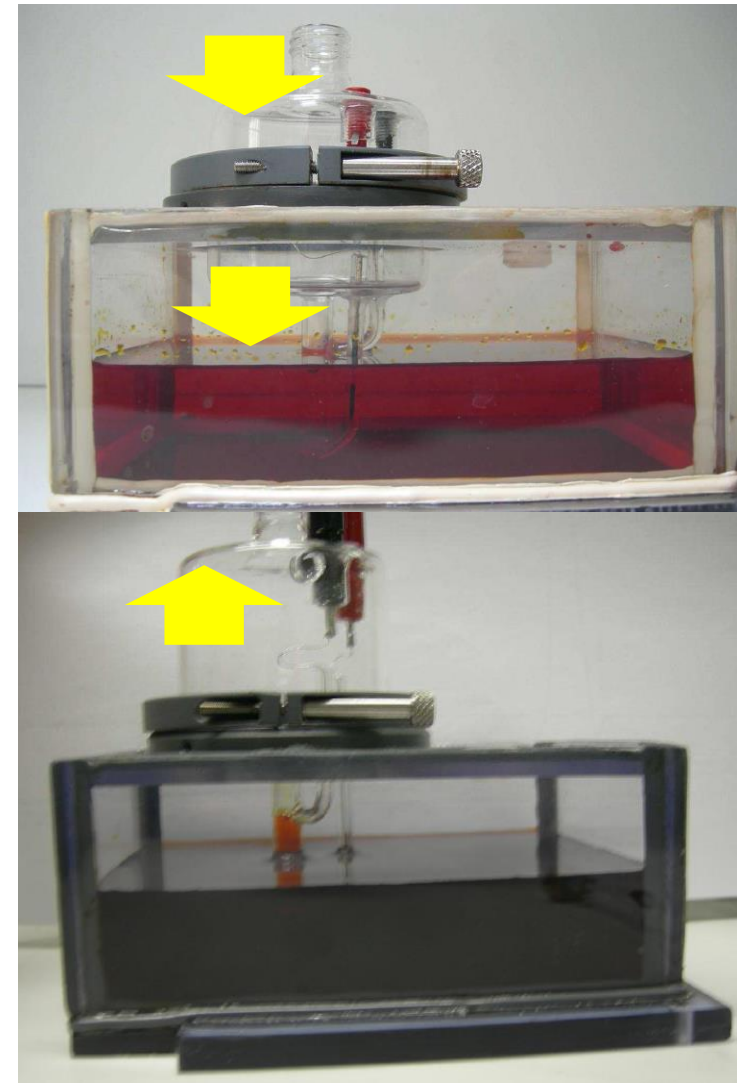
- Check the glass detector is clean and dry
 - Pay attention to the two metallic grids :
 - grids in good condition
 - no dust



Clean grid

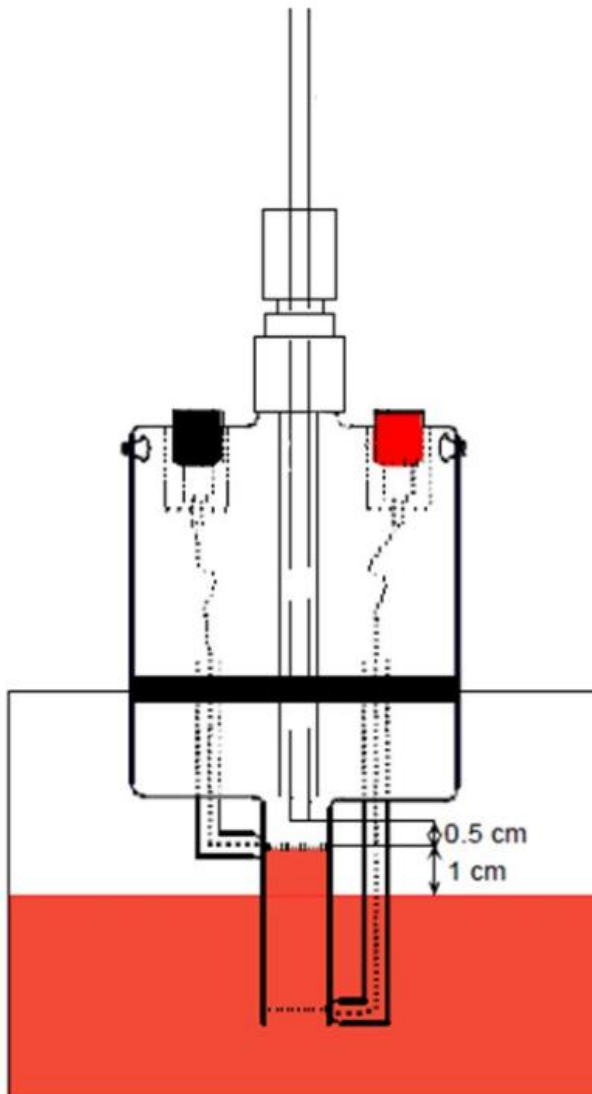
Installation – Put detector in the tank

- Gently immerse the detector in the solution, until touching the bottom of the tank
- Then pull the detector up
- Lastly, lock the position of the detector, using the coupling ring



Installation – Put detector in the tank

- A “perfect” installation should look like that:



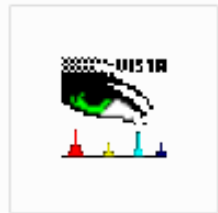
- No gas bubble
- No dust

Vistachrom Software



- Full analytical control
- Automatic storage of data (sample gas and calibration results)
- Visualization of the results obtained
- Full traceability for quality and audit trail purposes
- Real-time results transmitted via standard transfer protocols

Software – Log in



Vistachrom Log in

- Login : "SUPERUSER"
- Password : "1234"

Log in

Vistachrom

A red chromatogram line with three distinct peaks.The Chromatotec logo, featuring a stylized sun rising over a chromatogram peak, with the text "CHROMATOTEC" below it.

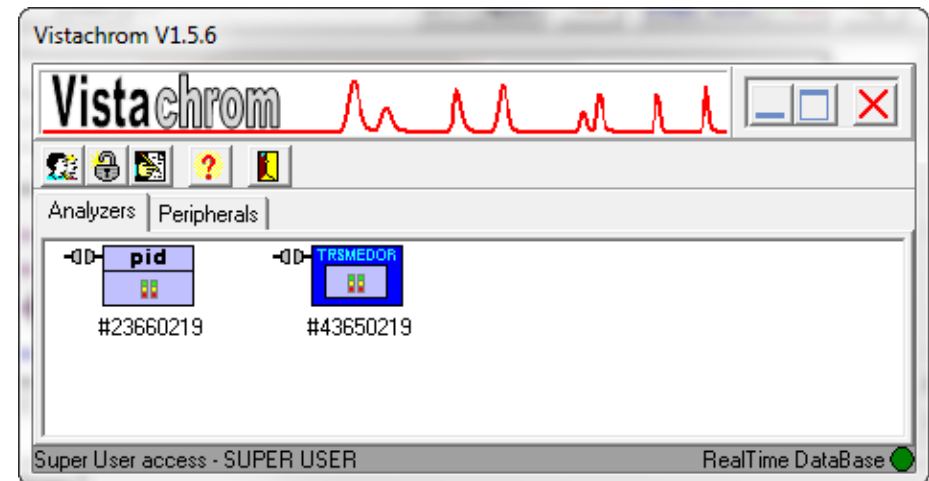
User Name :

Password :

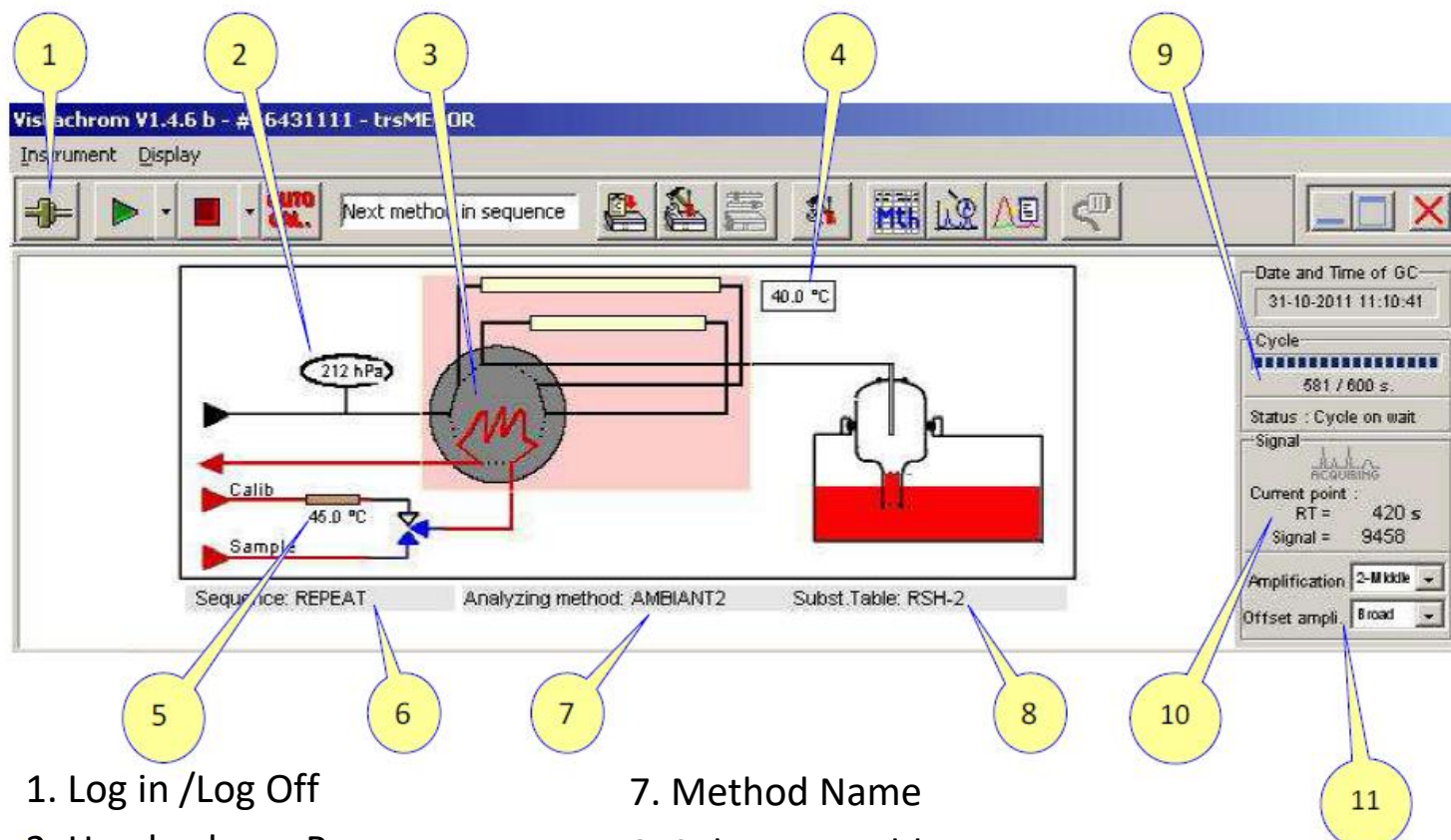
Software – “Main Window”

Main Window

- Each of the two modules is identified by the serial number
- Double-click on the SN to open the two “GC Windows”



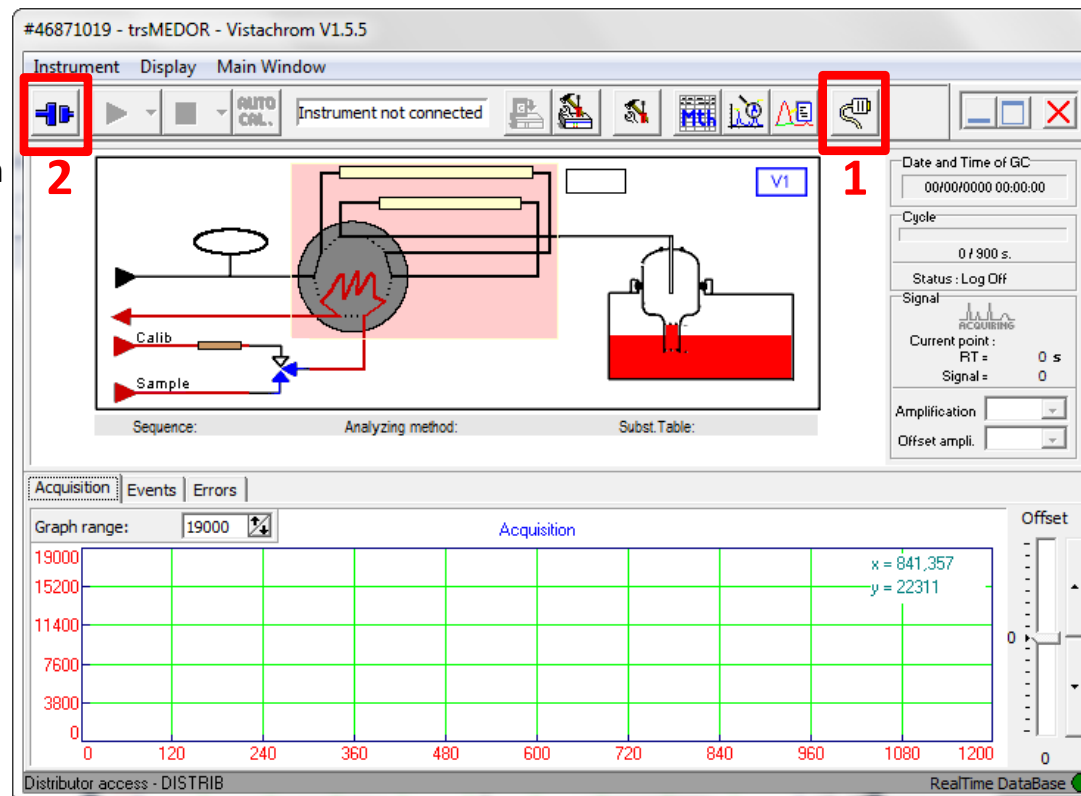
Software – “GC Window”



Software – Log on

- GC and computer must be ON
- LEDs on the two front panels : “stand by” and “OK” are ON, then:

2. Press on this icon to establish the communication GC-PC



1. Check the COM port is the one used for the communication GC-PC.

Usually:

COM3: Medor

COM1: PID

Verifications to do, before starting the first cycles

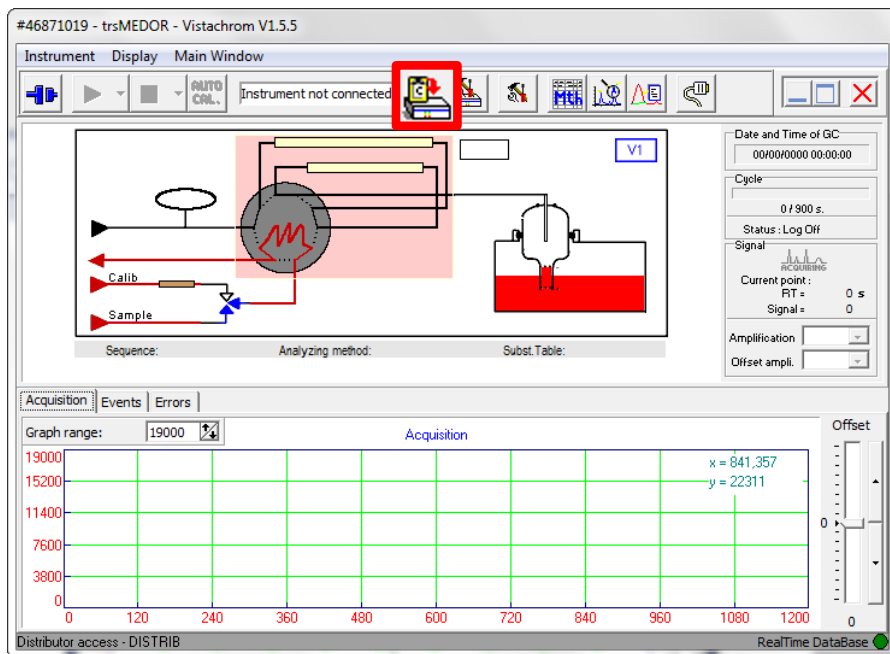
On the software:

- Head column pressure
- Calibration temperature
- Column temperature in stand by
- Check the two modules are perfectly synchronized (clock)

Physically on the instrument:

- Was the air generator purged one hour?
- Is the pump ON?
- Sampling flow measurement
- Calibration flows measurements
- Check the air pressure on the GC : 3 bars
- Install the permeation tube in the oven

Software – Upload Sequence



- Upload the sequence on the Medor
- Upload the sequence on the PID module

Requirements:

- The two sequences must have the same method programming
- Synchronization is needed

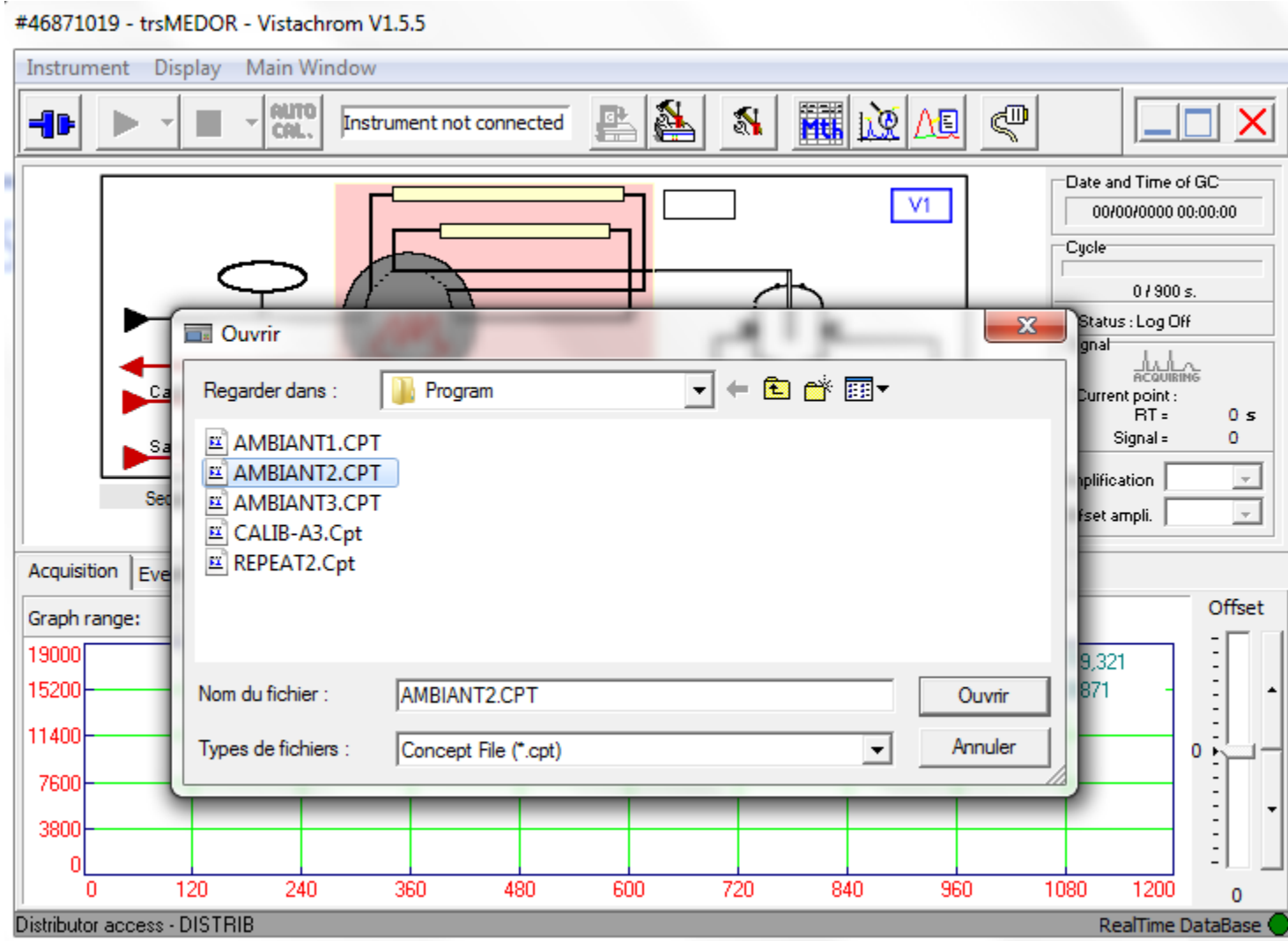
Medor:

AIR-20-2 (Sequence for MEDOR instrument type)			
Methods List			
#	Method	Jump Line #	Repetition
1	AIR-20-2		1
2	CAL20-2	1	1
3	AIR-20-2	34	

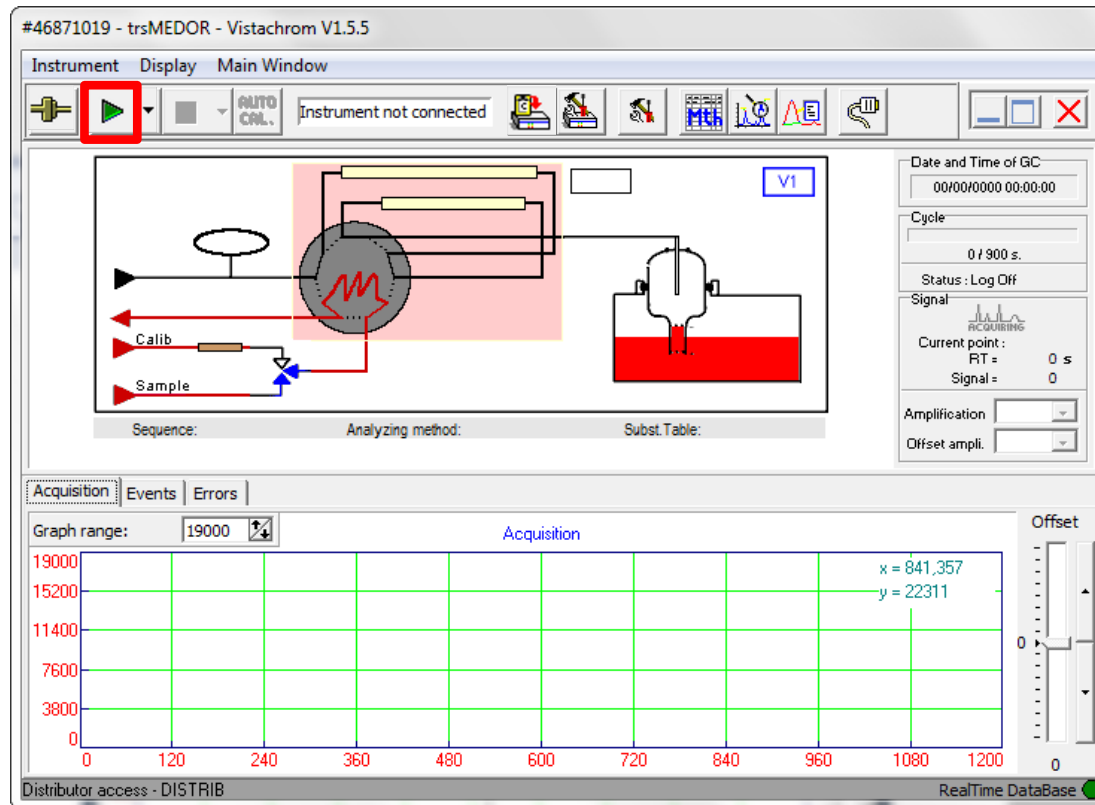
PID:

AIR-20-2 (Sequence for PID instrument type)			
Methods List			
#	Method	Jump Line #	Repetition
1	AIR-20-2		1
2	CAL20-2	1	1
3	AIR-20-2	34	

Software – Upload Sequence



Software – Start Sequence



Requirement:

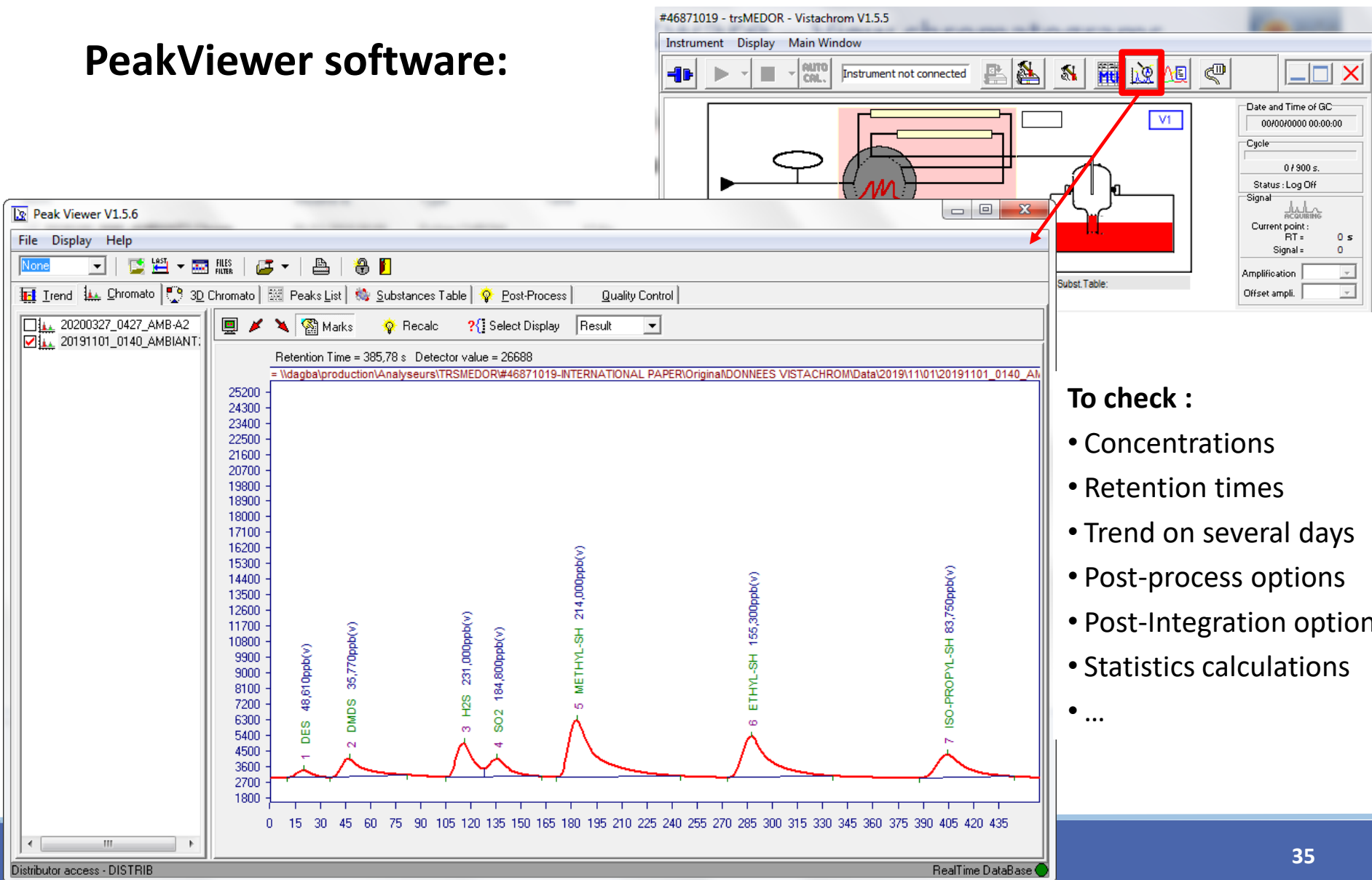
- Start “Medor sequence at the same time than “PID sequence!

Data storage: 

- Data is stored as raw chromatograms and ASCII files (Excel)
- Data files are recorded and stored with date, time, and method stamp
- Data can be transmitted to data acquisition system via Modbus protocol, 4-20mA module, ...

Software – View chromatograms

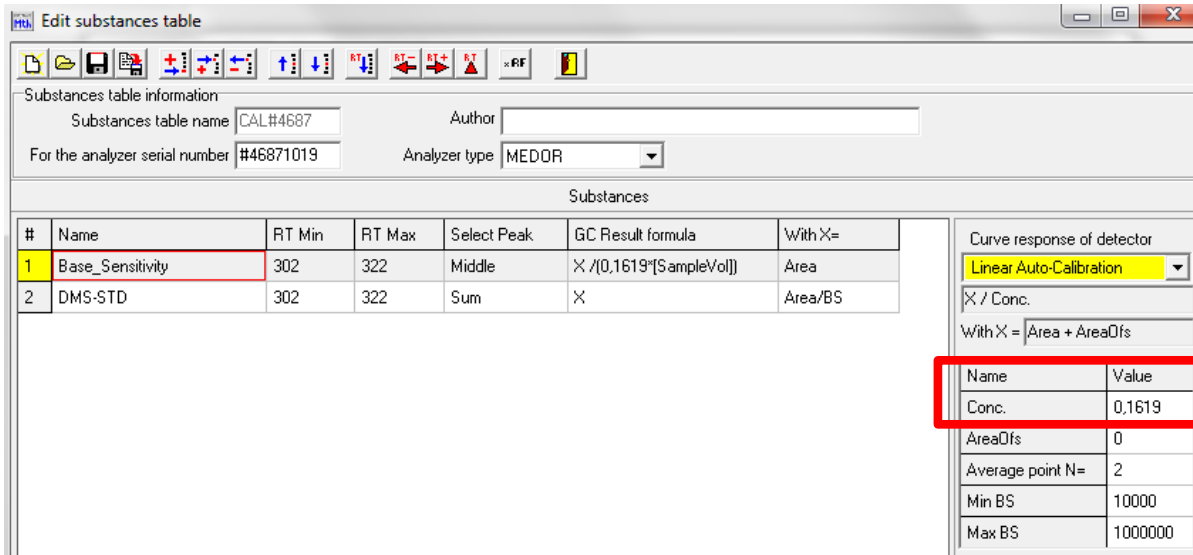
PeakViewer software:



Calibration – “Auto-Cal”

How to use the « Auto-Cal » option for each module?

- Write the expected calibration gas concentration in the calib substance table :

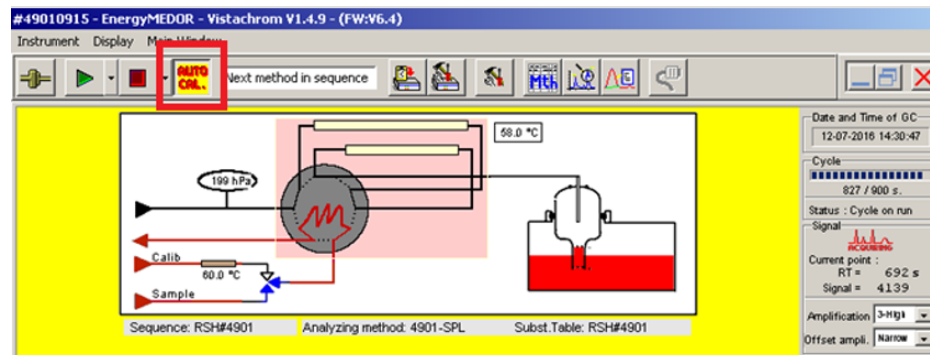


#	Name	RT Min	RT Max	Select Peak	GC Result formula	With X=
1	Base_Sensitivity	302	322	Middle	X / (0,1619*[SampleVol])	Area
2	DMS-STD	302	322	Sum	X	Area/BS

Name	Value
Conc.	0,1619
AreaOfs	0
Average point N=	2
Min BS	10000
Max BS	1000000

Unit : mg/m³

- The « Auto-Cal » option must be ON:



How the Base Sensitivity (BS) is calculated automatically?

$$BS = \frac{RF \cdot Area}{C}$$

Parameter	Unit	Name	Remark
BS	au/(mg/m ³)	Base Sensitivity	BS is used to know the sensitivity of an instrument
RF	None	Response Factor	RF is a constant value, displayed in the substance table, for each chemical compound
Area	au	Area below a peak	Area displayed below each peak on a chromatogram
C	mg/m ³	Concentration	

Goal of using « BS » parameter:

- Only one calibration gas is required to calibrate each module
- BS №1 for the Medor ≠ BS №2 for the PID
- Relative response factors are used to compare a compound to the reference compound
- Follow automatically the sensitivity of each module in time

What is the unit used for PID result?

- Total VOC is a « family » of different chemical compounds
- Each molecule has its own molar mass
- Unit for total VOC concentration = ppb (DMS equivalent)
- To convert $[VOC]_{\mu g/m^3}$ into $[VOC]_{ppb}$ « DMS equivalent »

$$[VOC]_{ppb \text{ DMS equivalent}} = \frac{[VOC]_{\mu g/m^3} \cdot V_m}{DMS \text{ molar mass}}$$

Parameter	Unit	Name	Remark
$[VOC]_{ppb \text{ DMS equivalent}}$	ppb	Concentration	
$[VOC]_{\mu g/m^3}$	$\mu g/m^3$	Concentration	
V_m	mol/L	Molar volume	$V_m = 24,04 \text{ L/mol}$ at 20°C
$DMS \text{ molar mass}$	g/mol	Molar mass	DMS molar mass = $62,13 \text{ g/mol}$

Every week:

- Check the chromatograms (nice base line, stable BS, peaks identification, ...)

Every month:

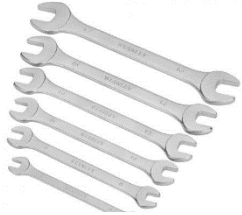
- Chromic acid level check (add deionized water if needed)
- Check the operating parameters : Pressures, flows, temperatures
- Check visually the Medor detector installation : no bubble
- Check the PID BS, clean the PID lamp if needed
- Check the sampling flow

Every year:

- Do the preventive maintenance actions, replacing the PM parts
- Full check of the instrument : Preset, flows, pressures, sensitivity, RF adjustments...

Service – tools required

Tools you absolutely must have:



Classic tool case:



Leak detector



ELECTRONIC FLOWMETER
(RANGE: 1 - 750 ML/MIN)
(TESTED)
CS_OT_00005-3000

Flowmeter



Several Swagelok
fittings
(1/8 and 1/4 size)



Flow regulator



Some meters of
PTFE tubes

Tools advised for advanced users (distributors):



**TRAP TOOL FOR PRESET FOR
CALIBRATION (TESTED)**
CS_OT_00012-0001



**ELECTRONIC MANOMETER
ASSY (RANGE: -1 À 2 BARS
(RELATIVE PRESSURE))
(TESTED)**
CS_SE_00007-MANO



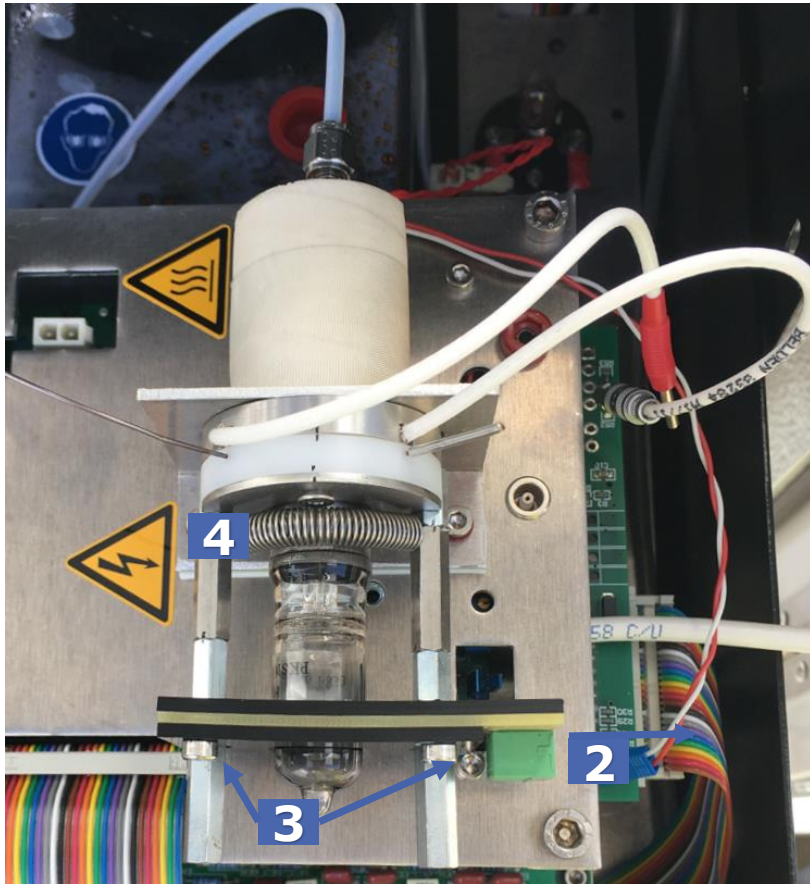
**MULTIMETER WITH
THERMOCOUPLE K OPTION
(TESTED)**
CS_OT_00016-0000



**CALIBRATION RESISTORS SET
FOR TEMPERATURE PRESET
(TESTED)**
CS_EL_00010-0001

Service – clean PID lamp

→ To be done every time the PID Base Sensitivity is too low



1. Switch OFF the instrument
2. Remove the HV cable
3. Unscrew the 2 screws to remove the PID plate
4. Press the spring to release the lamp
5. Remove the PID lamp
6. Use the special abrasive paste to clean the lamp
7. Rinse with water
8. Clean with acetone
9. Clean with pure Ethanol
10. Install again the lamp on the PID body
11. Press the central o-ring with the lamp to install it and be sure there is no leak
12. Install the PID plate again
13. Reconnect the HV cable
14. Check the sampling flow: be sure the PID has no leak

Preventive maintenance kits

« One year PM kit »:

Item number	Designation	Qty
Analyser		
CS_PN_00005-0110	Rotor 10 ports 1/8"	1
Internal Calibration		
AR_TU_09002-0000	O-Ring 1.5 x 0.75 mm Nitril	10
CS_TU_09000-0000	O-ring OR 22.5 x 1.5	1
CS_CL_00108-0001	Permeation tube DMS - around 60 ng/min - 45°C (airmotec certified at ± 10%)	1
PID detector		
AR_TU_00014-0002	O-ring for PID lamp 14 x 1.5 FPM 80	1
airmoPUMP		
EP_SA_00004-0001	Membran and valves Kit airmoPUMP	1

« 2 years PM kit »:

Item number	Designation	Qty	Unit Price
PID lamp			
CS_DE_00009-106V	PID Lamp - 10.6 eV. Tested airmotec	1	567.58 €

“3 years PM kit”:

Item number	Designation	Qty
Analyser		
CS_PN_00005-0012	Pneumatic actuator 10 ports	1
CS_PN_00004-0024	Distributor 24V	1
AR_EL_01033-0000	Set of fuses (3 x 3,15A - 1A - 315mA - 50mA)	1
CS_PN_06331-0341	3-way solenoid valve stainless steel (1/8")	1
CS_TU_00000-FRAC	Selection solenoid valve fittings kit	1
CS_FI_06012-COMP	Sample dryer tube (permeapure)	1
Internal PC		
GC_CP_00001-0001	Fan (int) (Only for MK1 and MK2 computer)	1
IT_CP_00340-0128	Hard disk 128Go SSD 2,5 (SATA connection) since 03/2012	1

“5 years kit”:

Item number	Designation	Qty
Analyser		
CS_CT_01000-CPUT	CPU Board, tested, Incl. Memory supply and H8	2

Troubleshooting - Medor



Symptom	Probable cause	Corrective action
Noisy/irregular base line	Problem on the glass detector installation (gas bubble, dust, ...)	Clean the detector, dry it and reinstall it in liquid solution Check the vibrations present in the environment
	Electronic noise	Check the electrodes are well connected /reconnect them
Peaks not identified	Head column pressure (HCP) is out of range	Check air pressure applied to the GC : 3 bars Adjust the HCP checking the QC report Adjust the RT ranges in the substance tables
	Oven temperature is not correct	Check that the environment temperature is stable Check the PT1000 temperature sensor is well connected
Base Sensitivity is not correct	The calibration flow is not correct	Check and adjust the calibration flow
	The permeation oven T is not correct	Check the Calib T according to the QC report
	The expected concentration of DMS is not correct	Check and adjust this concentration (in mg/m ³) in the calib substance table
	BS is out of range	Check in the calib substance table, the experimental BS is in the expected BS range
	Permeation tube is empty	Replace the permeation tube : every year
	Glass detector is dirty	If the BS is too low: clean the detector with HCl (10%) during 30min, water, acetone. Dry it and reinstall it.

Troubleshooting - Medor



Symptom	Probable cause	Corrective action
No detection, Flat base line	Offset setting is not correct	Adjust the offset to have the signal between 0 and 65000 If « auto-offset option » is used, check the configuration is OK
	Sample flow is not correct	Switch On the sampling pump Adjust the sampling flow, measuring it with a flowmeter
	The injection valve does not actuate	Check gas pressure applied on the valve : 3 bar Check injection valve functioning Replace the PM parts of the valve : rotor, actuator...
	The glass detector is not installed correctly	Clean the detector, dry it and reinstall it in liquid solution
Impossible to log on	GC is OFF (LEDs OFF on the front panel)	Use the internal Power switch to switch On the GC
	COM port used by Vistachrom is not the right one	Change the COM port used by Vistachrom
	Electronic bug	Start a « Hard reset »
Other strange phenomenons	Electronic/software bug	Start a « Hard reset »

Troubleshooting - PID

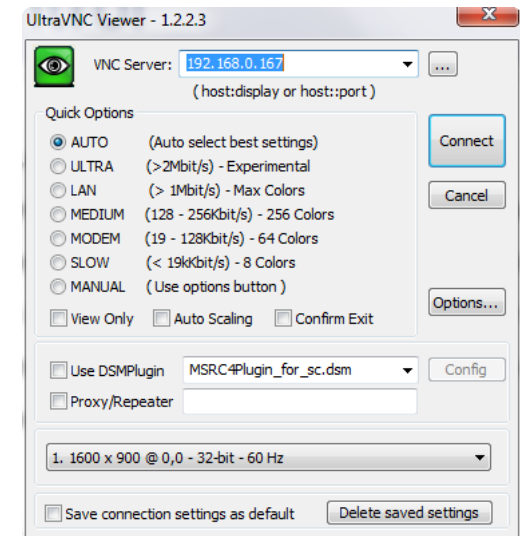


Symptom	Probable cause	Corrective action
No detection, Flat base line	Sample flow is not correct	Switch On the sampling pump Adjust the sampling flow, measuring it with a flowmeter Check there is no leak on the PID (lamp and o-ring...)
No peak during calibration	Leak around PID lamp	Check there is no leak on the PID (lamp and o-ring...)
	PID lamp is dirty	Clean the lamp, following Chromatotec procedure
	Medor and PID modules are not synchronized	Synchronize the two modules to have them running at the same time
Wrong Odor Index calculation	MathModule is OFF	Activate the MathModule in Vistachrom
	Medor and PID modules are not synchronized	Synchronize the two modules to have them running at the same time
Other strange phenomenons	Electronic/software bug	Start a « Hard reset »

Remote control

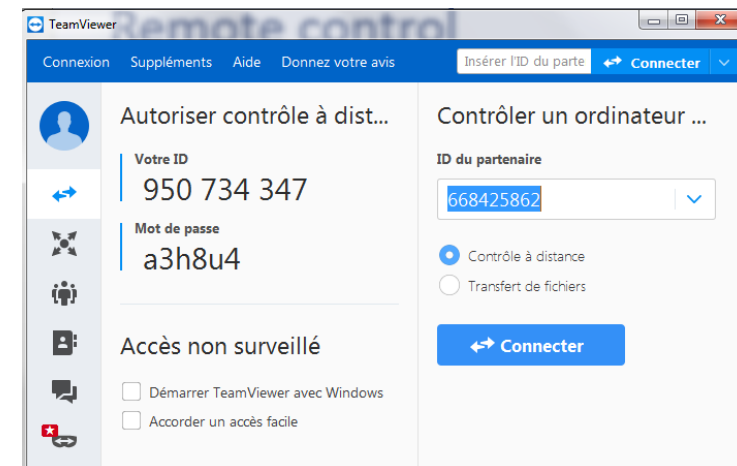
UltraVNC:

- Easy to use for local area connections
- On the Chromatotec computer, the software is automatically started at Windows start up
- On the remote computer, just write the IP address of the Chromatotec computer



TeamViewer:

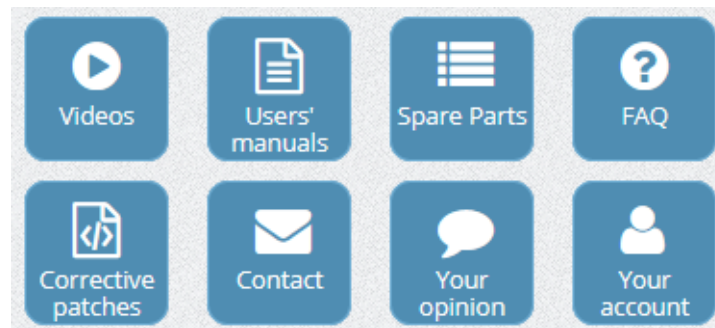
- Easy to use for connections through internet
- On the Chromatotec computer, start the software from: D/TeamViewer
- On the Chromatotec computer, write down the IP and password written in TeamViewer
- On the remote computer, just write these ID and password



Visit our technical website

We highly recommend you to have a look to our technical website.

<https://support.chromatotec.com/>

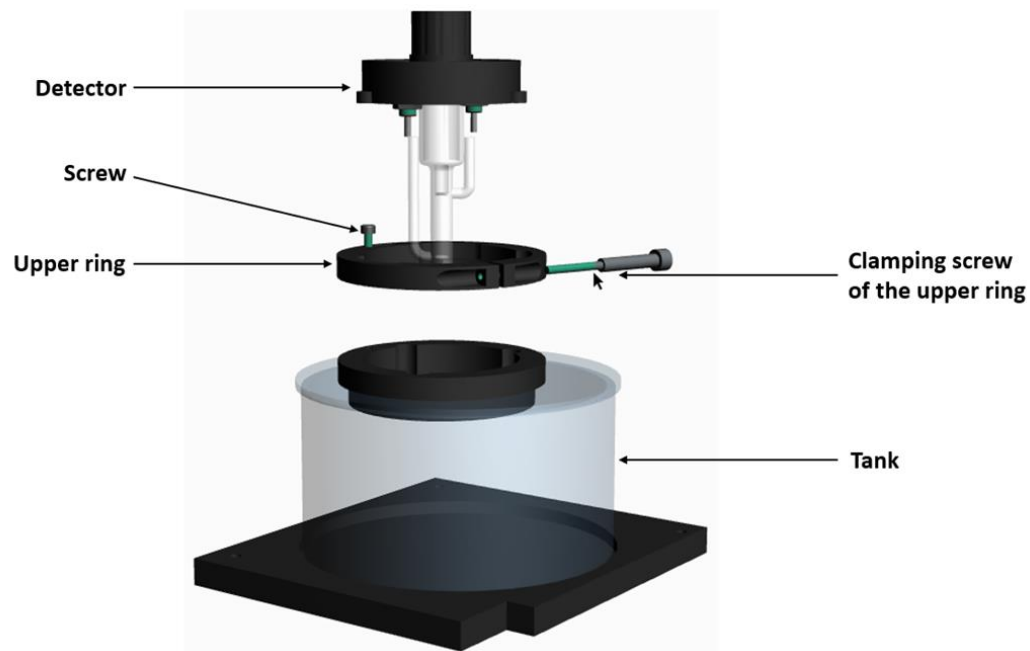
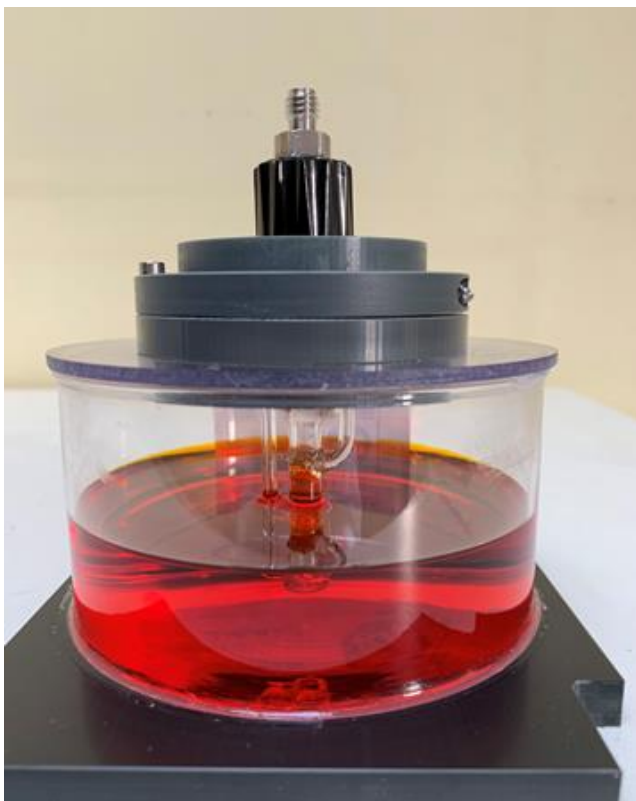


It is really helpful to:

- ✓ Start
- ✓ Understand the GC functioning
- ✓ Calibrate
- ✓ Maintain
- ✓ Solve a problem

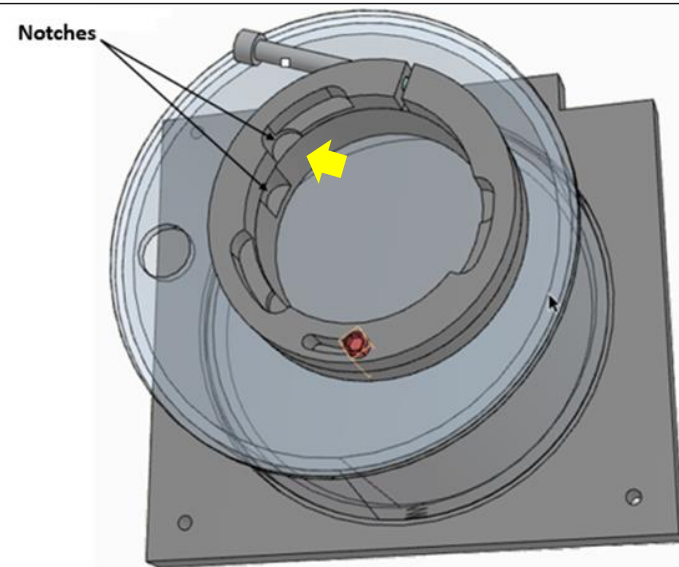
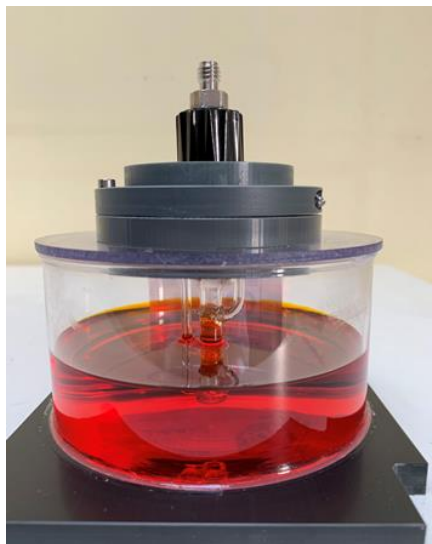
“Sulfurs Detector” - new design

- New tank



“Sulfurs Detector” - new design

- New detector



Thanks!

Thanks for choosing the Vigienose!



→ Future training sessions in the next days:

- New Vistachrom options
- BTX analyzers
- DetNH3
- New electronic boards
- ...

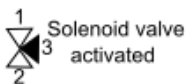
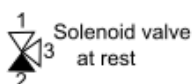
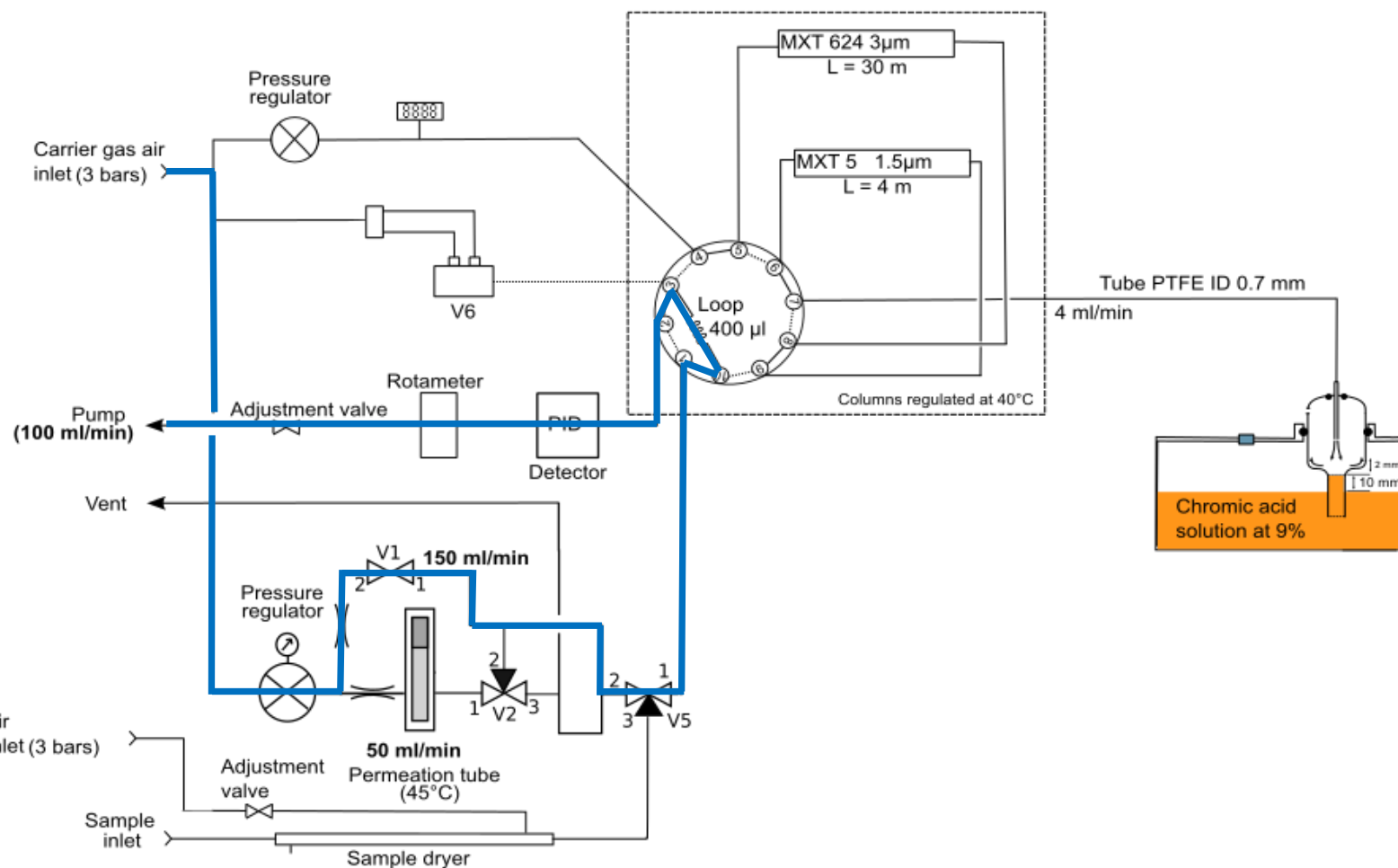


Thanks!



Thanks!

TRSMEDOR PID



Solenoid valve	Pneumatic scheme	Pneumatic valve position
0	————	Sampling
1	Injection



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SCHEMA DE PRINCIPE TRS MEDOR PID

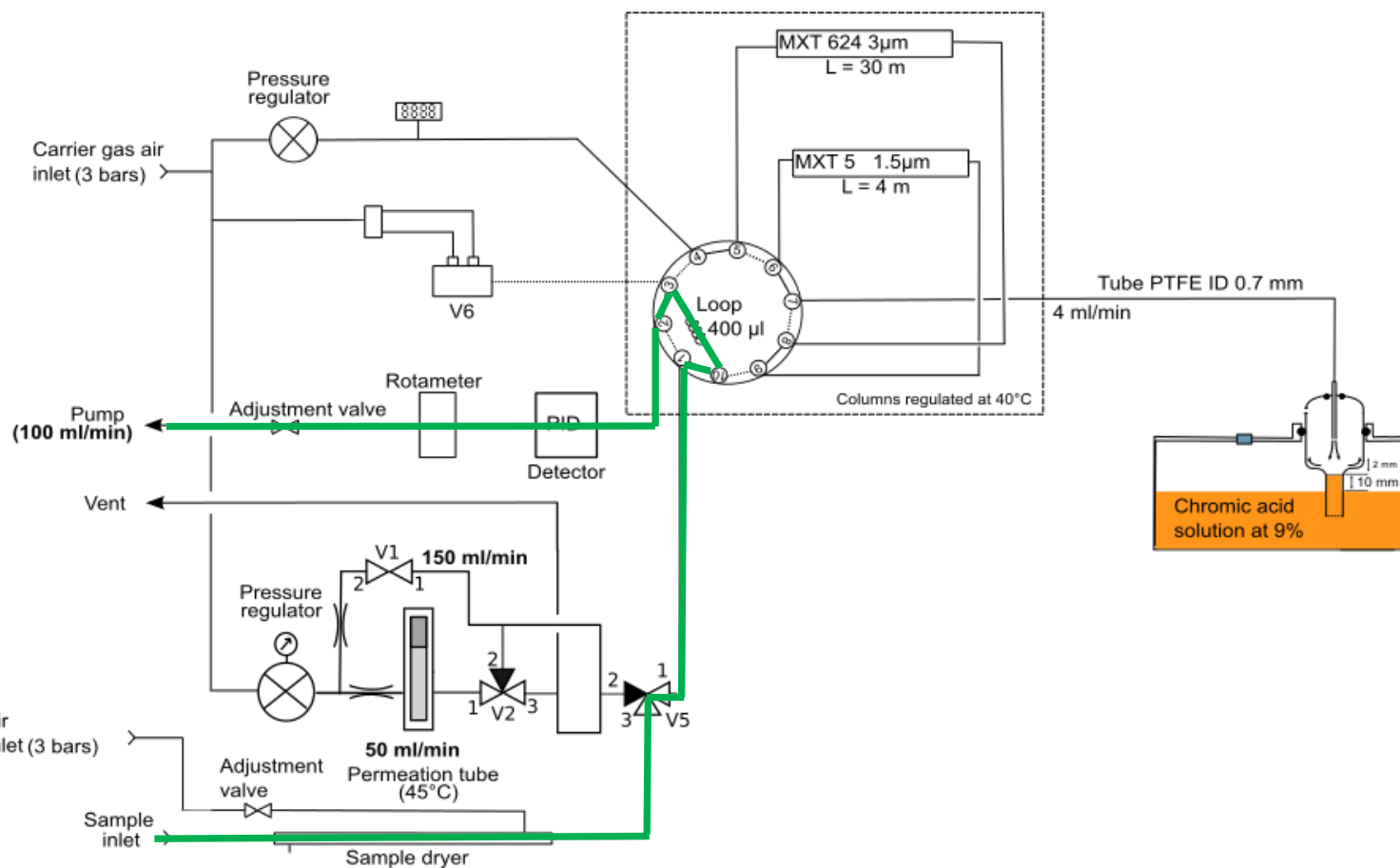
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Thanks!

TRSMEDOR PID



Solenoid valve	Pneumatic scheme	Pneumatic valve position
0	—————	Sampling
1	Injection



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